

REMARKS

This is in response to the Office Action dated April 17, 2003. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

Initially, on page 2 of the Office Action, the drawings are objected to under 37 C.F.R. §1.83(a). In response, proposed corrections of Figs. 2a and 2b are enclosed to clarify the relationship between the channels 10, 11, to permeable material 12, 13, the annuli 20 and the plugs 21. Also, sectional line A-A has been removed from Fig. 2a. Note that the reference numeral 24 and sectional line A-A are now referred to the specification.

Further, in item 2 of the Office Action, the Examiner states that reference characters (12, 13) designate the permeable cavity rings and a wall. This is basically correct because each of cavity rings 12, 13 together define a wall of the mold cavity. The specification has been amended to clarify this arrangement.

In view of the above, it is submitted that the objection to the drawings is now clearly obviated.

Next, on pages 3-4 of the Office Action, the specification is objected to based on a number of minor informalities. Accordingly, the specification and abstract have been revised, and a substitute specification and abstract has been prepared. No new matter has been added. Please note that the reference to claims 2-5 has been deleted from the specification and the protruding portion 24 of the plate 19 has been described. Furthermore, the trademark "Plexiglas" is now capitalized and accompanied by the generic

terminology. In view of the above, it is submitted that the objection to the specification of the present application is now clearly obviated.

Next, on page 5 of the Office Action, claims 1-8 are objected to based on a number of minor informalities. Accordingly, claims 1-8 have been canceled and replaced with new claims 9-18. Each of the new claims has been carefully drafted to ensure compliance with the requirements of 35 U.S.C. § 112, second paragraph. In view of the cancellation of claims 1-8 and the presentation of new claims 8-18, it is submitted that the objections to the claims are clearly overcome.

Next, on page 6 of the Office Action, claims 1-8 are rejected under 35 U.S.C. 112, first paragraph. However, this rejection is now moot in view of the cancellation of claim 1, and further in view of the fact that the language of the last two lines of original claim 1 have not been used in the new claims. Furthermore, it is submitted that the issues raised in the rejection of claims 1-8 under 35 U.S.C. 112, second paragraph have also been overcome by the presentation of the new claims.

Next, on page 6 of the Office Action, claim 1 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of copending application no. 10/018,174. However, new independent claims 9 and 14 of the present application, and the new independent claims of the application no. 10/018,174 now clearly recite different structural elements. Accordingly, in view of the presentation of the new claims in the respective applications, it is submitted that the obviousness-type double patenting rejection, set forth in the previous Office Action, is no

longer applicable between the present application and copending application no. 10/018,174.

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Next, on pages 8-10 of the Office Action, the claims are rejected over the prior art as follows:

Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Dantzig et al. (U.S. Patent No. 4,523,624);

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being obvious over Kittilsen et al. (U.S. Patent No. 5,915,455); and

Claims 1-8 are also rejected under 35 U.S.C. 103(a) as being obvious over Steen et al. (U.S. Patent No. 5,678,623).

It is submitted that the present invention, as defined in the new claims, now clearly patentably distinguishes over the applied references for the following reasons.

The present invention is directed to horizontal casting equipment in which gas and oil can be supplied to a horizontal metal mold in a controlled manner. The supply of the gas and oil can be differentiated around the circumference of the cast metal product. This ensures reduced primary cooling which provides a reduced inverse segregation zone, i.e. a more even chemical composition throughout the cross section of the cast metal.

Danzig discloses a process and apparatus for controlling the position of a cast ingot so that distortions of the metal casting are avoided. In the Danzig system, oil is supplied as a lubricant and water is supplied as a coolant. The water is supplied as a uniform curtain on the molten metal. Clearly, Danzig does not disclose an arrangement having

primary and secondary cooling zones. Danzig also lacks permeable wall material provided along an interior wall of the mold housing, wherein oil and/or gas can be supplied through said permeable wall material to the mold cavity in order to provide the primary cooling to the metal being cast.

Kittilsen discloses horizontal casting apparatus including a mold 10 having a primary cooling water circuit 11 and a secondary cooling water circuit 12. The mold also has an oil ring 19 for supplying oil to lubricate the mold. Also, a transition ring 21 is formed of insulating porous refractory material. A protective gas can be introduced behind the transition ring in order to prevent surface discoloration of the ingot. However, in Kittilsen the oil and protective gas are provided to the hot top and not to the mold. Further, the supply of oil and gas can not be differentiated around the circumference of the hot top surface.

Steen discloses a “vertical” casting apparatus including means for supplying water, oil and gas. When providing gas in a vertical mold, the gas will float up within the mold and create a ring of gas above the metal. Note, in Steen, the oil is provided prior to the gas. In the present invention, the gas is supplied prior to the oil, i.e. the opposite of that disclosed in Steen. If the teachings of Steen were employed in a horizontal casting operation, a gas pocket would be created at the top of the mold. In the present invention, the gas is supplied to a horizontal metal mold in the solidification area. The gas and oil are supplied through separate supply channels, thereby making it possible to differentiate the supply of gas and oil. As demonstrated above, none of the prior art references discloses such an arrangement.

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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